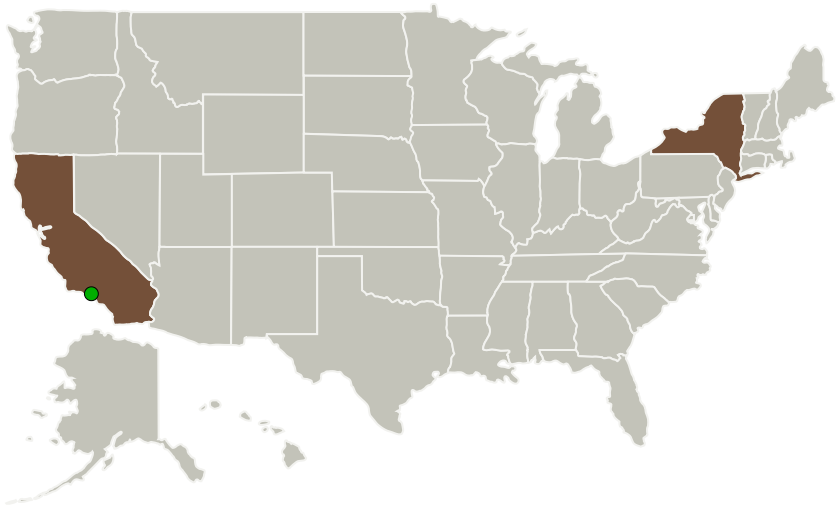
# Europa Drum Sampler (EDuS), Phase I

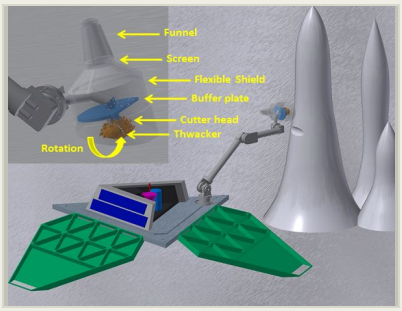
Completed Technology Project (2017 - 2017)

## Project Introduction

The main objective of the proposed work is to develop a robust and effective sample acquisition system for the Europa lander called the Europa Drum Sampler (EDuS). The proposed drum sampling system is based on a terrestrial roadheader design and includes a Thwacker that generates percussive vibrations during rotary excavation. All components will be designed to withstand Dry Heat Microbial Reduction as well as Planetary Protection requirements. The EDuS' structural components include a support boom, a buffer plate, and a cutter head. The support boom is hollow and its position and length can be adjusted depending on the required excavation depth and volume on the lander. For launch, the boom will be compressed and then spring-extended upon landing. A spring loaded boom has an added advantage of mitigating Thwacker vibrations to the Robotic Arm. The buffer plate is also a structural member whose main purpose is to prevent chips from falling out. The cuter head is the central part of the system. The cutter head has been designed in the shape of a typical cylindrical pressure vessel. The teeth are placed on all rotating surfaces, including the convex sides. This shape can deal with a range of surface topographies from flat to very jagged. The teeth are very sharp to reduce cutting forces and are made of carbide to increase longevity. The cutter head also includes a ring of teeth which make up the Thwacker Ratchet. Thwacking will reduce cutting forces and aid in sample delivery.

## Primary U.S. Work Locations and Key Partners






Europa Drum Sampler (EDuS), Phase I Briefing Chart Image

## Table of Contents

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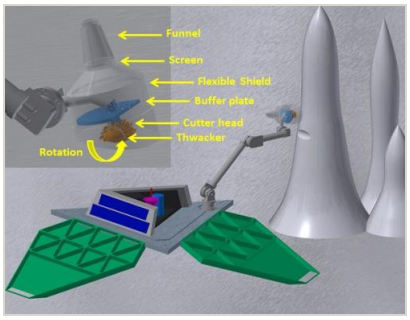
| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| Honeybee Robotics, Ltd. | Lead Organization | Industry | Pasadena, California |
| Jet Propulsion Laboratory(JPL) | Supporting Organization | NASA Center | Pasadena, California |

| Primary U.S. Work Locations | |
|---|---|
| California | New York |

## Images




**Briefing Chart Image**
Europa Drum Sampler (EDuS), Phase I Briefing Chart Image *(https://techport.nasa.gov/image/131367)*

## Organizational Responsibility

**Responsible Mission Directorate:**
Space Technology Mission Directorate (STMD)

**Lead Organization:**
Honeybee Robotics, Ltd.

**Responsible Program:**
Small Business Innovation Research/Small Business Tech Transfer

## Project Management

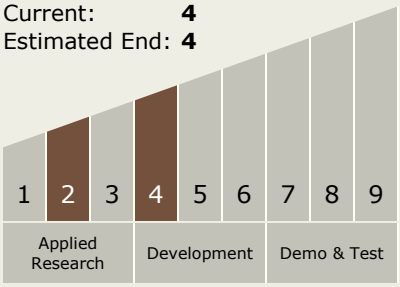
**Program Director:**
Jason L Kessler

**Program Manager:**
Carlos Torrez

**Principal Investigator:**
Kris Zacny

## Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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## Technology Areas

**Primary:**

- TX04 Robotic Systems
  - TX04.3 Manipulation
    - TX04.3.2 Grappling Technologies

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System